absolutely new, are worth recording, and should be well known to forest officers. Thus we are told (page 278) the proportion of water contained in wood varies according to the season. Schubler and Neuffler found in the fir (*Abies*) 53 per cent. in January and 61 in April; in the ash (*Fraxinus*), 29 per cent. in January and 39 in April. These facts prove that trees contain more water at the time of the ascent of the sap than in winter. Besides, it has been found that small branches contain more free water than large ones, and that these last contain more than the trunk, which results agree with the knowledge we possess of the porous nature of the different parts. The presence of the bark retards desiccation considerably.

Uhr having had some trees felled in June, after the ascent of the sap, and then having had them placed in the shade, found that those from which the bark had been removed had lost 34·53 per cent. of water in July, 38·77 in August, 39·34 in September, 32·62 in October; whilst those with the bark untouched had only lost during the same periods 0·41, 0·84, 0·92,0·98. Thus it will be seen that the desiccation of barked wood proceeds much more rapidly. It is only stripped trunks of small size and soft wood that dry up with the rapidity above mentioned.

The numerous woodcuts dispersed throughout the book, and more especially those showing the defects of wood, are accurate representations of the subjects intended to be illustrated. A large portion of the book is devoted to the consideration of felling and cutting up timber, and of machinery used in its manipulation. J. R. J.

OUR BOOK SHELF

Zur lehre der Parallel-projection und der Flächen. Von Prof. Dr. Wilhelm Matzka. (Prag, 1874.)
Grundzüge einer Theorie der cubischen Involutionen. Von Dr. Emil Weyr. (Prag, 1874.)

THESE two reprints from the "Abhandlungen der k. böhm. Gesellschaft der Wissenschaften" are purely mathematical, as may be gathered from their titles. The author of the first treatise states that the *orthogonal* projection of broken lines on given axes, whether in a plane or in space, has been discussed in scientific works on theoretical and practical mathematics, but the *oblique* projection has not obtained so great prominence. The subject is gone into very thoroughly by Dr. Matzka, as may be inferred from the fact of its discussion occupying 70 quarto pages.

The work by Dr. Weyr needs only to be mentioned in these columns, as his exhaustive treatment of any subject he takes in hand, especially of a geometrical character, is well known—"Nihil tetigit, quod non ornavit." The treatise occupies 54 quarto pages.

Practical Hints on the Selection and Use of the Microscope. By John Phin. (The Industrial Publication Company, New York.)

THE contents of the small volume before us fully justify the wording of its title. On the other side of the Atlantic the system of puffing worthless optical instruments seems to be on a much greater scale than in this country. "To the young student whose means are limited, and to the country practitioner whose ability to supply himself with instruments often falls far short of his desires, the offer of a serviceable microscope for a couple of dollars is a great temptation, and when the instrument in question is endorsed by a long list of clergymen, lawyers, and even editors, this temptation becomes irresistible." To show what these worthless microscopes really are, and what ought to be expected of the most ordinary one, are the main objects the author has in view in the earlier pages of the work. Further on he explains the manner of using the instrument, and the method of mounting specimens for examination. Accurate formulæ are given for the preparation of a large number of preservative solutions, amongst which we do not find any sufficiently novel to deserve special mention. It is in the practical nature of its remarks, and not in their novelty, that the value of Mr. Phin's short book rests, and to the tyro it will be found to give information of real value. Beside Mr. R. B. Tolles, J. Grunow, J. Zentmayer, and W. Wales are mentioned as manufacturers of good objectives in the United States; and Mr. McAllister's stands are particularly praised.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*]

The Sleep of Flowers

IN your "Notes" (vol. xii. p. 484) you mention a recent paper by M. Royer on this little-understood class of phenomena. We are acquainted with the objects of most of the spontaneous and periodical movements of plants, but of the physiological means by which these same movements are effected we know little or nothing. But it is important to remember that phenomena like in effect may be diverse in cause. The folding up of petals may have nothing physiologically in common with that of foliage-leaves. In fact, these phenomena may be divided into several classes. Thus movements due to irritation or concussion must be considered apart from those due to spontaneity, and the movements which form part of the series of processes of growth, such as the first unfolding of leaves and flowers, from those which occur in mature organs, though movements belonging to any two of these classes may be exhibited by the same plant, as in Oxalis and Mimosa. *Cereus grandiflorus* opens between 7 and 8 P.M., *Mirabilis jalapa* between 5 and 7 P.M. There is every probability that these times are those at which the insects which fertilise these two species also come forth, and that the same object exists in the case of other species which open and close their flowers more than once, "waking" and "sleeping;" but in the case of Cereus and Mirabilis the movement is one of growth only, though, no doubt, affected by external influences, such as the variation of heat and light. We have, however, cases of true "sleep" in *Ipomœa nil* and *Calystegia sepium*, which open between 3 and 4 A.M.; *Tragopogon*, the ligulate florets of which behave like petals, and which, opening at the same time, closes again before noon; *Anagallis arvensis*, opening at 8 A.M. and closing when the sky is overcast; the Mesembryanthaceæ, which open generally about 12—*Mesembryanthemum noctiflorum*, which opens between 7 and 8 P.M., being an exception; and *Victoria regia*, which opens for the first time about 6 P.M., closes in a few hours, opens again at 6 A.M., and closes finally and sinks in the afternoon; and in many other cases. Besides the causes mentioned in your note, the movements have been attributed to actinism. That they are not hygrometric is clear from the fact stated by Sachs, on the authority of unpublished experiments by Pfeffer ("Text-book of Botany," p. 798), that they take place under water. These same experiments show them to be due to variations in the temperature, and when the temperature is constant, to variations in the intensity of light, and also to be accompanied, at least in some cases, with an increase of the length of the inner side of the phyllæ of the perianth when opening. Light certainly seems to have more to do with the movements of the "poor man's weather-glass" than heat, though perhaps atmospheric pressure might equally well be argued to be their cause. We must remember that as osmotic action is constantly going on at the root-hairs and in the growing parts of living plants, so a constant molecular diffusion of gases is going on through cell-walls, besides the passage of gases through stomata. "The movements of diffusion," as Sachs says (p. 614), "tend to bring about conditions of equilibrium which depend on the co-efficients of absorption of the gas by

a particular cell-fluid, on the molecular condition of the cell-wall, &c., on temperature, and on the pressure of the air. But these conditions are continually varying, and the equilibrium continually disturbed." That a turgescence such as M. Royer describes occurs in many cases is well known, Space does not allow a detailed description of the physiological mechanism, but nearly all we yet know may be found in Sachs, who, however, attributes the phenomena directly solely to the passage of water and the elasticity of the cell-walls. Indirectly the cause may very possibly be heat acting as M. Royer supposes. It would be interesting to learn the effect of pollination on these plants, especially whether after it had taken place *Victoria regia* would re-open. G. S. BOULGER.

8, Westbury Road

Dehiscence of the Capsules of *Collomia*

IN Mr. Duthie's very interesting account (vol. xii. p. 494) of the mode of dehiscence of the capsules of this plant, he suggests that the purpose of the projection of the seeds on to the viscid hairs of the plant itself may possibly be found in its enabling the plant to live on its own seeds. Surely this is a superfluous and needlessly improbable hypothesis. The violent discharge of the seeds is undoubtedly one of the modes adopted by nature for their dispersion to plots of ground where the mineral constituents of the soil which they mainly require have not been entirely used up by the parent plant. Their interception by the parent plant is no doubt accidental. The purpose served by the viscid hairs of this and other plants still remains to be discovered if we follow the clue afforded by Mr. Darwin's observations on insectivorous plants. The violent expulsion of the seeds from the ripe capsule is a much more common phenomenon than that which we have exhibited in *Collomia*, together with a few other plants, as *Acanthus*, *Ruellia*, *Eschscholtzia*, and *Geranium*, where the whole fruit is thrown off together. Mr. Duthie will find a good description of the phenomenon in Hildebrand's "Die Schleuderfrüchte und ihr im anatomischen Bau begründeten Mechanismus," in Pringsheim's "Jahrbuch" for 1873–74. The author draws an interesting comparison between the structure of *Collomia*, with its single seed in each division, and its apparatus for projecting these to a distance, and that of the allied genus *Gilia*, with its numerous seeds in each division, which possess no such mechanism, but which, being much lighter, are consequently more easily dispersed by the wind.

ALFRED W. BENNETT

Oceanic Circulation

MR. CROLL'S statement (vol. xii. p. 494), that the North Atlantic in lat. 38° is above the level of the equator, is based partly on the *Challenger* soundings and partly on Muncke's determinations of the thermal expansion of sea-water, which, however, *were not made on sea-water at all*, but on a saline solution prepared for him by Leopold Gmelin, according to data furnished by the incomplete analyses of Vogel and Bouillon La Grange. As Mr. Croll's statement depends on such very minute differences of volume, I am led to ask him to compare the rate of expansion of *real* sea-water, as determined by Prof. Hubbard, with Muncke's table; he will notice a discrepancy sufficiently wide to make it a matter of interest to ascertain how far the employment of the American observations may serve to substantiate or modify his conclusion.

Yorkshire College of Science, Oct. 11 G. E. THORPE

High Waves with a North-west Wind

YOUR correspondent Capt. Kiddle has again called attention (vol. xi. p. 386) to the greater height of waves raised by a north-west wind, over those raised by a S.W. wind. I have observed the fact twice in the mid-Atlantic, but also very often on the west coast of Scotland, from which it is evident the phenomenon can be due to no particular combination of currents.

An examination of synoptic charts, for the dates of many cases, has convinced me that the phenomenon is due to the nature of the circulation of the air in a cyclone.

In the south-east portion of a cyclone, where S.W. winds are found, the wind seems to blow along and almost off the surface of the sea; while in the south-west portion, where N.W. winds are found, the wind seems to bear down on the sea, and "harrow," it into streaks of foam.

A perfectly analogous phenomenon appears in dust whirls, where to the right front of the centre the dust is closely packed, and tends to rise off the ground; while behind the centre the dust is "raked," into streaks by the more downward direction of the blast.

The portion of the Atlantic about 45° N. latitude, and between 40° and 50° W. longitude, where Capt. Kiddle has observed such high waves, has long been known as the "Roaring Forties." An examination of synoptic charts of the North Atlantic, for every day of the year 1865, shows that the bad weather in those parts is generally due to one of two conditions of the distribution of atmospheric pressure.

In the commoner case, the great area of high barometric pressure, which constantly covers the North Tropical Atlantic, stretches northwards to the east of Newfoundland like a wedge, on the east side of which cyclones are formed which go in an E. or N.E. direction.

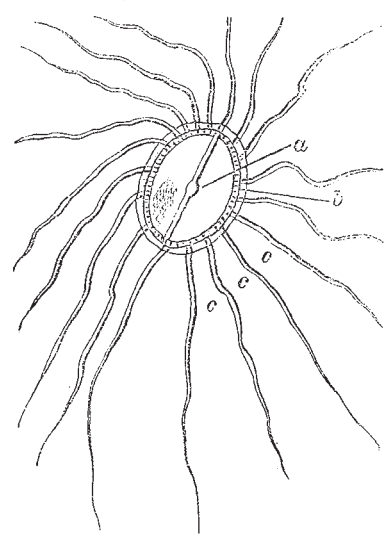
In the rarer but more violent case, the great Atlantic area of high pressure rises into two heads or humps, one about Madeira, the other about Bermuda, stretching up to Newfoundland. Cyclones coming from Labrador work round this hump to the S.E., and die out in mid-Atlantic. In either case gradients for N.W. winds, often very steep, are formed between the fortieth and fiftieth parallels of longitude. RALPH ABERCROMBY

21, Chapel Street, S.W., Oct. 1

Diatoms

I HAVE reason to think that I have made a discovery which may change the ideas of naturalists as to the nature of some *Diatoms*.

In collecting *Diatomaceæ* I have found a species of *Navicula* (?) which is invested with a gelatinous envelope, and from the edges of the frustule project a number of long processes or arms of the same soft nature. These vary much in number, in some specimens being eight or ten, and in others as many as twenty-five or even more. They are longer than the frustule, and radiate from it with much regularity. The Diatoms when detected (upon a floating *fucus* common in the sea hereabout) were dead, and I was unable to detect any movements.



a, the frustule: *b*, the gelatinous envelope projecting beyond the margin; *c c c*, the processes, or pseudopodia.

I have examined so many individuals of this *Diatom* that I think it hardly likely that I have been deceived, as they are by no means very minute.

Dr. Carpenter, in the fifth edition of his admirable work on the microscope, speaks of some observations by Mr. Stevenson on the genus *Coscinodiscus*, which hint at the possibility of some Diatoms having appendages projected through apertures of the frustule. The highest power of my microscope is one of Messrs. R. and J. Becks, $\frac{1}{8}$th, a very fine glass.

I propose to forward as soon as possible the sticks, dry and in balsam, as well as the "gathering" in spirits, to a competent diatomist, who will confirm my observations if correct, and I send this to NATURE to secure priority in case I have really made a discovery. W. W. WOOD

Manila, July 20